COMPOSITE MEDIA FILE BROADCASTING PROGRAM BROADCASTING CONTROL SYSTEM

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates generally to a composite media file broadcasting program broadcasting control system. More particularly, the invention relates to a broadcasting control system of a composite media file broadcasting program having an interactive function in a digital broadcasting.

DESCRIPTION OF THE RELATED ART

A video and audio broadcasting program broadcasting system in television and radio is generally constructed with an organizing unit managing a program frame of each program to be broadcasted in one channel and a time frame for commercial message in the program frame, a producing unit producing a broadcasting contents and a broadcasting unit performing broadcasting of broadcasting data along designated broadcasting schedule information.

Such video and audio broadcasting program broadcasting system is controlled by a broadcasting schedule information map called as a play list. Here, a broadcasting schedule information map is a table describing information permitting the broadcasting unit to correctly broadcast the contents produced by the

organizing unit or the production unit. More
particularly, the broadcasting schedule information map
is a table, in which a certain program frame is divided
into smaller time frames and for each frame, a

5   broadcasting start time, a broadcasting continuing
period, and an attribute value of the broadcasting
content to be broadcasted in the corresponding time
frame. The play list describes a broadcasting start
time, a broadcasting continuing period, kind of the

10 contents to be broadcasting in the time frame, i.e.
broadcasting program or commercial message, and address
information of video content and audio content to be
broadcasted in the corresponding time frame, which play
list is prepared by the organizing unit. The producing

15 unit sets the video content and the audio content to be
broadcasted in the address designated in the play list.
The broadcasting unit obtains the content in the
designated address on the basis of the play list from
the producing unit to perform broadcasting preparatory

20 process for processing into a broadcasting data in a
form capable of broadcasting for broadcasting prepared
broadcasting data at designated broadcasting start time.

Among the broadcasting programs, it is expected
to modify the broadcasting schedule, such as extension

25 or early termination of game, such as sport relay
program. The broadcasting program broadcasting control
system has to be instantly responsive to such change to

perform control for performing broadcasting with modified broadcasting schedule. In case of expected modification of the broadcasting schedule information, the broadcasting schedule is modified by modifying the

5 play list to transfer the modified schedule to the broadcasting unit.

A multi-channel broadcasting system disclosed in Japanese Unexamined Patent Publication (Kokai) No. Heisei 10-285505 (which will be referred to hereinafter

10 as "first prior art") is a system characterized by adaptation for abrupt change of the broadcasting contents. In the disclosed system, a basic play list and a modified play list are prepared so that, when the broadcasting contents are modified, a part of the basic

15 play list is replaced with the modified play list adapting to the broadcasting contents. At this time, since the broadcasting unit preliminarily obtain contents designated in both play lists for preparation of broadcasting, broadcasting corresponding to abrupt

20 modification process can be realized.

The foregoing is related to the video and audio broadcasting program broadcasting system broadcasting a stream media, such as video, audio and so forth.

In the digital broadcasting, there are some

25 broadcasting programs which broadcasts non-stream media data, such as composite media file and so forth. The composite media file broadcasting program is called as

data broadcasting program. There are two kinds of
broadcasting. One is the broadcasting program, in which
the composite media file is solely broadcasted. The
other is the broadcasting program, in which the

5   composite media file is broadcasted as additional
information cooperative with video program (stream media
program) for presenting both of video program and the
composite media file simultaneously.

One of broadcasting method of the composite

10   media file is DSM-CC(Digital Storage Media Command
Control) data carousel system defined in ISO
(International Standardization Organization)/IEC
(International Electrotechnical Commission) 13818-6. In
this system, respective files forming the composite

15   media file is repeatedly broadcasted so that the
broadcasted composite media file can be obtained by
starting viewing the program at any timing. The
broadcasted data to be broadcasted in this system is
consisted of data of constituent files of the composite

20   media file (DDB: Download Data Block), and broadcasting
control data, such as each file name, file sizes, file
types, version number of files incremented at every
occasion of updating.

The present invention is applicable for the

25   composite media file broadcasting program broadcasting
system employing the DSM-CC data carousel system. The
composite media file broadcasting program broadcasting

file basically has similar structure as the video and audio broadcasting program broadcasting system. Namely, broadcasting of the program is performed by the organizing unit, the producing unit and the broadcasting

5 unit.

The broadcasting schedule information map controlling the video and audio broadcasting program broadcasting system is only the play list prepared by the organizing unit.

10 The composite media file broadcasting program broadcasting system is also controlled according to a broadcasting schedule information map (which will be referred to as organized schedule information map for discriminating from the play list). However, in

15 addition to this, it has to be controlled even by the broadcasting schedule information map prepared by the producing unit. The reason is that since the composite media file is static different from the stream media, if the display content of the data broadcasting program is

20 desired to vary according to elapse of time within the time frame, the broadcasting data has to be varied at every occasion of varying display content and the broadcasting schedule information map for this purpose is present. Variation is divided into two stages.

25 Namely, modification to change overall composite media file in the time frame of the organized schedule information and modification by updating content of each

file forming the composite media file are present. The
producing unit prepares both broadcasting schedule
information maps respectively adapting to the foregoing
two stages of modifications in addition to the composite

5   media file to be object for broadcasting. The former
broadcasting schedule information map will be
hereinafter referred to as "composite media file
modified schedule information map" and the later
broadcasting schedule information map will be

10 hereinafter referred to as "file updating schedule
information map".

Namely, the broadcasting schedule information
map of one composite media file broadcasting program is
consisted of the organized schedule information map as

15 the broadcasting schedule information map per time frame
prepared by the organizing unit, the composite media
file modified schedule information map prepared by the
producing unit, the file updating schedule information
map for each constituent files of the composite media

20 file.

The broadcasting unit of the composite media
file broadcasting program combines the organized
schedule information map prepared by the organizing unit,
the composite media file modified schedule information

25 map prepared by the producing unit and the file updating
schedule information map for each constituent files of
the composite media file for deriving the minimum time

frame in which modification of the broadcasted data is performed, obtaining aggregate of the file forming the composite media file to be broadcasted per time frame to prepare the broadcasting data from the aggregate of the file (broadcasting preparatory process). Then, at the broadcasting start time of each time frame, the prepared broadcasting data is broadcasted.

The aggregate of the constituent files of the composite media file, for which broadcasting is initiated at a certain timing, is obtained by combining file updating schedule information map of all constituent files of the composite media file. For example, for the composite media file consisted of constituent files A and B, when the content of the file A is updated to a - a' and - a" at a time 7:00 - 7:10 - 7:20, and the content of the file B is updated to b - b' at a time 7:00 - 7:05, the aggregate of the file to be broadcasted at respective broadcasting start timings are as follows:

start broadcasting at 7:00:   a and b
start broadcasting at 7:05:   a and b'
start broadcasting at 7:10:   a' and b'
start broadcasting at 7:20:   a" and b'

The foregoing is the case where the broadcasting start timings of the file updating schedule information map is

filed.

In case of the composite media file broadcasting program associated with live video program, there is a program broadcasting mode wherein while the contents to be broadcasted is preliminarily determined, the broadcasting start timing is determined during broadcasting of the program as the broadcasting timing of the composite media file has to be synchronized with the broadcasted video image, which will be hereinafter referred to as untime broadcasting. For example, relay broadcasting of sporting game, such as baseball, a staff of a broadcasting station instructs starting of broadcasting of "Homerun Special Data Quiz Program" at a timing of homerun in the baseball. This is the untime broadcasting.

The untime broadcasting is transferred to the broadcasting unit with including the broadcasting schedule information having undetermined broadcasting start timing (untime broadcasting schedule information) in the broadcasting schedule information map prepared by the organizing unit and the producing unit. The broadcasting unit performs broadcasting process at the broadcasting start timing of untime broadcasting input from a trigger input device.

Even in the conventional video and audio broadcasting program broadcasting system, it has been adapted for untime broadcasting by untime broadcasting

of commercial message (CM) or the like in radio program
or modification of the broadcasting data by switch at a
timing designated in the modification schedule
information map as discussed in the first prior art. At
5 this time, the play list for modification is present and
information of the video contents and audio contents of
the untime broadcasting is described. Therefore,
broadcasting preparatory process is preliminarily
performed in the broadcasting unit, the broadcasting
10 data can be performed instantly responding to the
designation of the broadcasting start timing.

If the broadcasting preparatory process cannot
be performed before broadcasting of the program in the
broadcasting unit, the broadcasting preparatory process
15 is performed upon determination of the broadcasting
start timing of the untime broadcasting. For process
period, it is possible to cause incapability of
broadcasting at the designated broadcasting start timing.

Upon performing broadcasting preparatory process
20 in the composite media file broadcasting program, the
aggregate of the constituent files forming the composite
media file to be initiated broadcasting at a certain
timing has to be obtained.

In order to obtain the aggregate of the files,
25 context of the updating timing of respective files are
required. For example, concerning the composite media
file consisted of the files A and B, consideration is

given for the file updating schedule where the content

of the file A is updated to a - a' - a" at respective

time of 7:00 - 7:10 - 7:20, and the content of the file

B is updated to b - b' at certain timing. The timing at

5   which b is updated to b' is untime broadcasting and is

determined during broadcasting of the program. If the

time is 7:05, the aggregate of the files to be

broadcasted is as follows:

10   start broadcasting at 7:00:   a and b

start broadcasting at 7:05:   a and b'

start broadcasting at 7:10:   a' and b'

start broadcasting at 7:20:   a" and b'

15   When the timing to update b to b' is 7:15, the

aggregate of the files to be broadcasting is as follows:

start broadcasting at 7:00:   a and b

start broadcasting at 7:10:   a' and b

20   start broadcasting at 7:15:   a' and b'

start broadcasting at 7:20:   a" and b'

At this time, the aggregate of the files to be

broadcasting at the updating timing of b to b' is a' and

25   b' and is different from a and b' in the former case.

Namely, depending upon context of the broadcasting start

timing of the untime broadcasting and the broadcasting

start timing of the updating schedule of A, the aggregate of the files to be broadcasted at the broadcasting start timing of the untime broadcasting can be differentiated.

5   Accordingly, in order to perform the broadcasting preparatory process of the program, in which untime broadcasting is performed, in the broadcasting unit, the context of the broadcasting start timings of the file updating schedule information of

10   respective files forming the composite media file has to be definitely determined.

Accordingly, in order to realize broadcasting preparatory process of the untime broadcasting, some measure in expression method of the broadcasting start

15   timing in the broadcasting schedule information map has to be taken.

The broadcasting program is often subject to re-using. In addition to rebroadcasting, the image of CM is used repeatedly, and also, the part of the

20   broadcasted program may be reused at introduction or ending of the series program.

Reusing of the conventional video and audio broadcasting program can be easily realized by diversion of the video content and the audio content without any

25   process. When the program is reused together with CM, reusing can be realized by rewriting the broadcasting start time in the play list.

In case of reusing of the composite media file
broadcasting program, not only the composite media file
per se but also the file updating schedule information
are inherently required, and may further required the
5   composite media file modification schedule information.
The broadcasting schedule information map is reused,
modification of all broadcasting start timings becomes
necessary. In the composite media file broadcasting
program, a plurality of broadcasting schedule
10 information maps established in hierarchy and
respective broadcasting start timings are associated
with each other, it has been desired to have an approach
for modification of the broadcasting start timings
without causing contradiction.

15

SUMMARY OF THE INVENTION

An object of the present invention is to provide
a composite media file broadcasting program broadcasting
control system, in which a broadcasting unit may attain
20 an aggregate of constituent files of a composite media
file per time identifier and can perform broadcasting
preparatory process from a condition where fixed
broadcasting start timing is not obtained by using order
information of the time identifier and hierarchically
25 presenting plurality of data broadcasting schedule
information maps.

Another object of the present invention is to

provide a composite media file broadcasting program broadcasting control system which enables expressing the broadcasting schedule information map where an untime broadcasting schedule information is present even when

5   the untime broadcasting schedule information order of the broadcasting start timing is unknown, to permit judgment whether the broadcasting preparatory process is possible or not and whereby to enable broadcasting preparatory process when the broadcasting schedule

10   information map in higher hierarchy is present.

A further object of the present invention is to provide a composite media file broadcasting program broadcasting control system which can derive the broadcasting start timing without tracing the hierarchy

15   of the broadcasting schedule information maps by separately holing a plurality of data broadcasting schedule information maps for which real time values are not set and the time information which can be expressed independently and linearly.

20   A still further object of the present invention is to provide a composite media file broadcasting program broadcasting control system which can realize shifting of the broadcasting start timing required for changing of the broadcasting start timing of the program

25   or for reusing, with simple process by varying the value set in a time object without varying the broadcasting schedule information maps.

A yet further object of the present invention is to provide a composite media file broadcasting program broadcasting control system, in which all broadcasting start timings are expressed along a single time axis and thus makes complicate process, such as tracing of the hierarchy of the broadcasting schedule information maps upon obtaining the time value.

A still further object of the present invention is to provide a composite media file broadcasting program broadcasting control system, in which an attribute is added to time information managed independently of the broadcasting schedule information map, and classifying means is provided for classification based on the attribute for simplification of taking out only broadcasting schedule information to be object for working.

A still further object of the present invention is to provide composite media file broadcasting program broadcasting control system which enables broadcasting control of the program designated a screen modification timing in various modes by using four kinds of time objects.

A still further object of the present invention is to provide composite media file broadcasting program broadcasting control system which can discriminate portions for which broadcasting preparatory process is possible and portions for which broadcasting preparatory

process is not possible in one program by using time classification codes, and enables broadcasting preparatory process for the portion other than the portions where the broadcasting preparatory process is

5 not possible, and thus enables instantly broadcasting of next broadcasting data by the broadcasting unit.

A yet further object of the present invention is to provide a composite media file broadcasting program broadcasting control system, in which a schedule control

10 unit is provides a function for outputting data broadcasting schedule information to be broadcasting at timing from order information of the several kinds of time objects to enable broadcasting unit to prepare broadcasting data.

15 A yet further object of the present invention is to provide a composite media file broadcasting program broadcasting control system which enables broadcasting preparatory process by providing a function for outputting order information of several kinds of time

20 objects for the schedule control unit even in the program where the order of the time objects is undeterminable.

According to one aspect of the invention, a composite media file broadcasting program broadcasting

25 control system comprising:

an organizing unit generating and managing organized schedule information map expressing program

frame and time frame of CM in the program frame as broadcasting information;

a producing unit obtaining broadcasting schedule information map based on the organized schedule

5   information map generated by the organizing unit, assigning composite media file to be actually broadcasted to each time frame expressed in the broadcasting schedule information map and generating composite media file modification schedule information

10 map and file updating schedule information map of each file forming the composite media file;

a schedule control unit receiving the organized schedule information map managed by the organizing unit, the composite media file modification schedule

15 information map and the file updating schedule information map held in the producing unit and performing unitary management thereof; and

a broadcasting unit for broadcasting a broadcasting data to a transmission line according to a

20 broadcasting schedule information provided from the schedule control unit.

In the preferred construction, the composite media file broadcasting program broadcasting control system further comprises

25 a storage device storing a program information, a broadcasting schedule information map and a time information; and

a trigger input device commanding modification of the broadcasting data of the program on broadcasting to the broadcasting unit.

In another preferred construction, the organizing unit includes organized schedule information map input means for inputting the program information and the organized schedule information map to the schedule control unit.

In another preferred construction, the producing unit includes map input means for inputting the composite media file modification schedule information map and the file updating schedule information map for each file forming the composite media file to the schedule control unit.

In another preferred construction, the broadcasting unit comprises:

unitary broadcasting schedule information map generating means for obtaining the broadcasting schedule information map and order information of time identifiers used in the broadcasting schedule information map obtained from the schedule control unit and generating a unitary broadcasting schedule information map;

broadcasting preparing means for performing broadcasting preparatory process on the basis of the unitary broadcasting schedule information map generated by the unitarily broadcasting schedule information map

generating means; and

composite media file broadcasting means for broadcasting a broadcasting data prepared per designated broadcasting start timing.

5   In another preferred construction, the schedule control unit comprises:

broadcasting schedule information map registering means for univocally assigning a program identifier to a program, storing attribute information

10   input from the organizing unit and program information of the map of the program identifier, and generating data broadcasting schedule information map and a time object map from the broadcasting schedule information map for storing in the storage device;

15   broadcasting schedule information map outputting means for outputting the data broadcasting schedule information map of the program to be object from input program associated information; and

time information output means for outputting

20   order information on a time axis of the time object and time object map.

In another preferred construction, the storage device comprises:

program information storage portion for storing

25   program information;

broadcasting schedule information map storage portion for hierarchically storing the broadcasting

schedule information map;

time information storage portion for storing time object map and time object.

In another preferred construction, the trigger input device comprises:

a plurality of broadcasting data modification trigger input devices providing modification command of the broadcasting data to the broadcasting unit upon performing untime broadcasting.

According to another aspect of the invention, a composite media file broadcasting program broadcasting control method in a composite media file broadcasting program broadcasting control system including an organizing unit managing program frame and time frame of CM in the program frame, producing unit generating a composite media file to be broadcasted and broadcasting schedule information, broadcasting unit performing broadcasting of broadcasting data to a transmission line according to information provided from the organizing unit and the producing unit, and a trigger input device designating modification of broadcasting data of the program on broadcasting to the broadcasting unit, the method comprising the steps of:

setting pointer information to broadcasting schedule information map storing broadcasting start timing without setting real time value as broadcasting start timing of a plurality of the broadcasting schedule

information map in hierarchy;

storing time object and attribute information thereof expressing one point on a time axis in the broadcasting schedule information map storing the

5   broadcasting start timing;

enabling broadcasting preparatory process in the broadcasting unit even in a condition where broadcasting start timing is not fixed by expressing order of time by time expressing function provided for the time object;

10   and

performing broadcasting instantly responding to determination of broadcasting start timing during broadcasting.

In the preferred construction, a time identifier

15   as identification information of the time object is set in the broadcasting start timing of the broadcasting schedule information and expressing association on a time axis of different broadcasting schedule information maps by using the same time identifier when the same

20   timing is expressed in different broadcasting schedule information map.

In another preferred construction, in the time object, context of the time objects on a time axis is expressed by three kinds of times of time fixed type,

25   range designation type and offset designation type and discriminate the time not known the context.

In another preferred construction, the context

of broadcasting start timing of broadcasting schedule information at the same or different hierarchical levels on the time axis by the time object of range designation type and offset designation type.

5   In another preferred construction, which uses kind of unit generated the time object, such as organizing unit, producing unit or the like, kind of time object, such as time fixed type, range designation type and offset designation type, kind of trigger input

10   device determining a real time value for the time object in range designation, and extending character string as attribute information of the time object registered in the time object map,

classifying broadcasting schedule information

15   determining broadcasting schedule information fixing broadcasting start timing in the broadcasting unit, broadcasting schedule information of not fixed time and time are determined in association, and obtaining time list to be determined by the trigger input device by

20   realizing classification function of the time object by the attribute information.

In another preferred construction, lump modification of time information is realized by expressing only pointer information to the time

25   information without presenting real time value in the broadcasting schedule information for facilitating partial reusing of the composite media file broadcasting

program.

In another preferred construction, the time object of time fixed type expresses a time by real time value, the offset designation type time object expresses time with the time identifier of the objective time object and relative time from the time object, and the range designation type time object expresses the time with range start time value or the time identifier of the time object using the range start time value and range end value or the time identifier of the range end time.

In another preferred construction, the time object further includes an association type expressing context of time objects on the time axis by expressing the time with the time identifier of the objective time object and start relative time and end time in addition to three kinds of time objects of time fixed type, range designation type and offset designation type, and whereby discriminating the time object unknown the context.

In another preferred construction, the context of the broadcasting start timings of the broadcasting schedule information of the same or different hierarchical levels on the time axis by the range designation type, offset designation type and associated type time objects.

In another preferred construction, the trigger

input device for permitting user to determined

broadcasting start timing, presents time range where the

time becomes effective on a user interface, by

expressing the broadcasting start timing of the

5 broadcasting schedule information by the range

designation type and association type time object.

In another preferred construction, the schedule

control unit is provided with a function for making

judgment whether the aggregate of four kinds of time

10 objects of the time fixed type, range designation type,

offset designation type and association type can be

sorted in order of time or not, and if sorted, utilizing

topological sorting theory of the order of the time

object.

15 In another preferred construction, screen image

modification timing to be provided trigger from the

trigger input device in a time range by the time fixed

type and range designation type time object, the

schedule control unit is provided with a function for

20 making judgment of order of the time objects for

enabling broadcasting of data broadcasting program

performed screen image modification.

In another preferred construction, screen image

modification timing to be provided trigger from the

25 trigger input device in a time range by the time fixed

type, range designation type and offset designation type

time object, the schedule control unit is provided with

a function for making judgment of order of the time

objects for enabling broadcasting of data broadcasting

program performed screen image modification.

In another preferred construction, screen image

5 modification timing to be provided trigger from the

trigger input device in a time range by the time fixed

type, range designation type and association type time

object, the schedule control unit is provided with a

function for making judgment of order of the time

10 objects for enabling broadcasting of data broadcasting

program performed screen image modification.

In another preferred construction, four kinds of

time objects of time fixed type, range designation type,

offset designation type and association type are used

15 for expressing screen image modification timing provided

trigger by the trigger input device in a certain time

range, expressing screen image modification timing for

modifying screen image after a given period from trigger,

and expressing screen image modification timing provided

20 trigger from the trigger input device in a time range

before a certain timing, and the schedule control unit

is provided function for judgment of order of time

object for enabling broadcasting of data broadcasting

program with admixed screen image modification modes.

25 In another preferred construction, which is

provided function for designating condition utilizing

attribute information of the time object registering the

time object map, taking out partial aggregate of time
object having attribute adapted to the condition from
the aggregate of the time object of the program and
making judgment whether the time objects forming the
5   partial aggregate can be sorted in order of time or not
and order of time object as can be sorted.

In another preferred construction, which uses
kind of unit generated the time object, such as
organizing unit, producing unit or the like, kind of
10   time object, such as time fixed type, range designation
type and offset designation type, kind of trigger input
device determining a real time value for the time object
in range designation, and extending character string as
attribute information of the time object registered in
15   the time object map,   classifying broadcasting schedule
information determining broadcasting schedule
information fixing broadcasting start timing in the
broadcasting unit, broadcasting schedule information of
not fixed time and time are determined in association,
20   and obtaining time list to be determined by the trigger
input device by realizing classification function of the
time object by the attribute information.

In another preferred construction, broadcasting
data is broadcasted instantly responding to the timing
25   of trigger by enabling broadcasting preparatory process
even for the portion where the judgment of order is
possible by dividing the program into a plurality of

time zones upon organization and production even in the
program, in which judgment of order of time of the time
object can be made and the portion judgment of the order
of time of the time object is not possible, by using the
5   time classification code of the attribute information of
the time object registered in the time object map.

In another preferred construction, as the
attribute information of the time object to be
registered in the time object map, kind of the time
10 object is provided for enabling handing of time objects
having different data structure in single time object
map with maintaining accessibility of particular kind of
time object.

In another preferred construction, the time
15 object expressing one point on the time axis in various
mode is handled with single time object map in a lump,
an attribute for discriminating kind of the time object
in the time object map to handle the screen image
modification timing with the identifier as a common item
20 to be provided in respective time object in the data
broadcasting schedule information map, to define the
time object having new data structure when the time
expressing not premised in the screen image modification
timing for adaptation without requiring modification of
25 the data broadcasting schedule information map.

In another preferred construction, the schedule
control unit has a function for outputting data

broadcasting schedule information, in which when the order of the time object is determined, the schedule control unit takes the time indicated by each time object as the broadcasting start timing, for

5 facilitating generation of the unitary broadcasting schedule information map from the time object map.

In another preferred construction, the broadcasting unit includes a function for designating a plurality of variations of order of aggregates of the

10 time objects as demanding order of the aggregates of the time object to the schedule control unit, when the order of the aggregates of the time objects is judged by the schedule control unit, if some candidates of the order are present, and if number of the candidates falls

15 within a designated number, broadcasting preparation process corresponding to all candidates are performed by the broadcasting by providing a function for outputting all candidates, when the time of the time object is fixed by trigger and order of the aggregates of the time

20 objects is fixed, by selecting the broadcasting data corresponding to the fixed order from the prepared broadcasting data for enabling instantly broadcasting the broadcasting data without performing broadcasting preparation process for broadcasting of the broadcasting

25 data instantly responding to the trigger timing.

Other objects, features and advantages of the present invention will become clear from the detailed

description given herebelow.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood more

5 fully from the detailed description given herebelow and

from the accompanying drawings of the preferred

embodiment of the invention, which, however, should not

be taken to be limitative to the invention, but are for

explanation and understanding only.

10   In the drawings:

Fig. 1 is a block diagram showing a construction

of the first embodiment of a composite media file

broadcasting program broadcasting control system

according to the present invention;

15   Fig. 2 is an illustration showing a data

structure showing a time object map in the first

embodiment of the composite media file broadcasting

program broadcasting control system according to the

present invention;

20   Fig. 3 is an illustration showing a data

structure showing three kinds of time objects in the

first embodiment of the composite media file

broadcasting program broadcasting control system

according to the present invention;

25   Fig. 4 is a flowchart showing a process in the

first embodiment of the composite media file

broadcasting program broadcasting control system

according to the present invention;

Fig. 5 is an illustration exemplifying program information in the first embodiment of the composite media file broadcasting program broadcasting control

5 system according to the present invention;

Fig. 6 is an illustration exemplifying an organized schedule information map in the first embodiment of the composite media file broadcasting program broadcasting control system according to the

10 present invention;

Fig. 7 is an illustration exemplifying information stored in a storage device at a timing where organized schedule information map is registered in the first embodiment of the composite media file

15 broadcasting program broadcasting control system according to the present invention, wherein program information stored in the program information storage portion;

Fig. 8 is an illustration exemplifying

20 information stored in the storage device at a timing where the organized schedule information map is registered in the first embodiment of the composite media file broadcasting program broadcasting control system according to the present invention, wherein data

25 broadcasting schedule information map (hierarchy 1) stored in the broadcasting schedule information map storage portion;

Fig. 9 is an illustration exemplifying information stored in the storage device at a timing where the organized schedule information map is registered in the first embodiment of the composite

5   media file broadcasting program broadcasting control system according to the present invention, a time object map is stored in a time information storage portion;

Fig. 10 is an illustration exemplifying composite media file modification schedule information

10 map corresponding to a broadcasting schedule information of a time identifier "Q-START" in Fig. 8;

Fig. 11 is an illustration showing the composite media file modification schedule information map of startup.htm as an example of composite media file

15 modification schedule information map named as "Q1-question" in Fig. 10;

Fig. 12 is an illustration showing the composite media file modification schedule information map of back.jpg as an example of composite media file

20 modification schedule information map named as "Q1-question" in Fig. 10;

Fig. 13 is an illustration showing the composite media file modification schedule information map of button.jpg as an example of composite media file

25 modification schedule information map named as "Q1-question" in Fig. 10;

Fig. 14 is an illustration showing the composite

media file modification schedule information map of button2.jpg as an example of composite media file modification schedule information map named as "Q1-question" in Fig. 10;

5   Fig. 15 is an illustration exemplifying state transition of screen when the composite media file is broadcasted along the composite media file modification schedule information map of Figs. 11 to 14, showing start condition;

10   Fig. 16 is an illustration exemplifying state transition of screen when the composite media file is broadcasted along the composite media file modification schedule information map of Figs. 11 to 14, showing button image updating;

15   Fig. 17 is an illustration exemplifying state transition of screen when the composite media file is broadcasted along the composite media file modification schedule information map of Figs. 11 to 14, showing background and button updating condition;

20   Fig. 18 is an illustration exemplifying the data broadcasting schedule information map (hierarchy 2) registered corresponding to Fig. 10;

Fig. 19 is an illustration exemplifying the broadcasting schedule information map (hierarchy 1)

25   stored in the broadcasting schedule information map storage portion at a timing where registration of information of a producing unit is completed in the

first embodiment of the composite media file

broadcasting program broadcasting control system

according to the present invention;

Fig. 20 is an illustration exemplifying data

5   broadcasting schedule information map (hierarchy 3)

registered corresponding to Fig. 11, showing data

broadcasting schedule information map (hierarchy 3)

registered corresponding to Fig. 11;

Fig. 21 is an illustration showing data

10   broadcasting schedule information map (hierarchy 3)

registered corresponding to Fig. 12;

Fig. 22 is an illustration showing data

broadcasting schedule information map (hierarchy 3)

registered corresponding to Fig. 13;

15   Fig. 23 is an illustration showing data

broadcasting schedule information map (hierarchy 3)

registered corresponding to Fig. 14;

Fig. 24 is an illustration exemplifying a time

object map stored in the time information storage

20   portion at a timing where registering of information of

the producing unit is completed in the first embodiment

of the composite media file broadcasting program

broadcasting control system according to the present

invention;

25   Fig. 25 is an illustration exemplifying the

order information of the time identifier obtained from

the schedule control unit in the first embodiment of the

composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 26 is an illustration exemplifying united broadcasting schedule information map prepared for broadcasting preparatory process by the broadcasting unit in the first embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 27 is an illustration showing a time fixed type time object map as an example of a time object map output per time kind by time information output UNIT in the first embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 28 is an illustration showing a offset designation type time object map as an example of a time object map output per time kind by time information output unit in the first embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 29 is an illustration showing a range designation type time object map as an example of a time object map output per time kind by time information output unit in the first embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 30 is an illustration showing a range

designation type time object map as an example of a time object map output per time kind by time information output unit in the first embodiment of the composite media file broadcasting program broadcasting control

5 system according to the present invention;

Fig. 31 is an illustration exemplifying a user interface of a trigger input device in the first embodiment of the composite media file broadcasting program broadcasting control system according to the

10 present invention;

Fig. 32 is a flowchart showing a trigger correspondence process to be performed by the broadcasting unit upon receipt of trigger in the first embodiment of the composite media file broadcasting

15 program broadcasting control system according to the present invention;

Fig. 33 is an illustration exemplifying an organized schedule information in the second embodiment of the composite media file broadcasting program

20 broadcasting control system according to the present invention;

Fig. 34 is an illustration exemplifying composite media file modification schedule information map and file updating schedule information map in the

25 second embodiment of the composite media file broadcasting program broadcasting control system according to the present invention, showing a composite

media file modification schedule information map

corresponding to a frame of "BB broadcasting station";

Fig. 35 is an illustration showing a file

updating schedule information map of startup.html of bb-

5   cm;

Fig. 36 is an illustration showing a file

updating schedule information map of back.jpg of bb-cm;

Fig. 37 is an illustration showing a file

updating schedule information map of intro.wave of bb-

10   cm;

Fig. 38 is an illustration exemplifying data

broadcasting schedule information map in the second

embodiment of the composite media file broadcasting

program broadcasting control system according to the

15   present invention, in which illustrated the data

broadcasting schedule information map (hierarchy 1)

corresponds to Fig. 33;

Fig. 39 is an illustration showing the data

broadcasting schedule information map (hierarchy 2)

20   corresponding to Fig. 34;

Figs. 40, 41 and 42 are illustrations showing

data broadcasting schedule information map in the second

embodiment of the composite media file broadcasting

program broadcasting control system, in which Fig. 40 is

25   an illustration showing the data broadcasting schedule

information map (hierarchy 3) corresponding to Fig. 35,

Fig. 41 is an illustration showing the data broadcasting

schedule information map (hierarchy 3) corresponding to Fig. 36, and Fig. 42 is an illustration showing the data broadcasting schedule information map (hierarchy 3) corresponding to Fig. 37;

5   Fig. 43 is an illustration exemplifying a time object map stored in the second embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

           Fig. 44 is an illustration exemplifying an order

10   information of the time identifier obtained from the schedule control unit in the second embodiment of the composite media file broadcasting program broadcasting control system according to the present invention, showing the order information of the time identifier in

15   which the order is known;

           Fig. 45 is an illustration exemplifying an order information of the time identifier obtained from the schedule control unit in the second embodiment of the composite media file broadcasting program broadcasting

20   control system according to the present invention, showing the order information of the time identifier in which the order is not known;

           Fig. 46 is an illustration exemplifying an order information of the time identifier obtained from the

25   schedule control unit in the second embodiment of the composite media file broadcasting program broadcasting control system according to the present invention,

showing the order information of the time identifier in which the order is not known;

Fig. 47 is an illustration exemplifying a united broadcasting schedule information map prepared for broadcasting preparatory process by the producing unit in the second embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 48 is an illustration showing a data structure showing an association type time object to be used in the third embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 49 is an illustration showing a flow of the order judgment process of the time object in the third embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 50 is an illustration showing a data structure showing an association type time object to be used in the fourth embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 51 is a flowchart showing a process in the fourth embodiment of the composite media file broadcasting program broadcasting control system according to the present invention;

Fig. 52 is a flowchart showing a broadcasting process in the broadcasting unit in the fourth embodiment of the composite media file broadcasting program broadcasting control system according to the

5   present invention;

Fig. 53 is a flowchart showing a trigger input process of the broadcasting unit in the fourth embodiment of the composite media file broadcasting program broadcasting control system according to the

10   present invention;

Fig. 54 is an illustration showing an example of data broadcasting schedule information corresponding to a time identifier "Q-Q1Q-2" obtained from the schedule control unit in the fifth embodiment of the composite

15   media file broadcasting program broadcasting control system according to the present invention;

Fig. 55 is a flowchart showing broadcasting process of the broadcasting unit in the fifth embodiment of the composite media file broadcasting program

20   broadcasting control system according to the present invention; and

Fig., 56 is a flowchart showing a order judgment process of time object of the schedule control unit in the sixth embodiment of the composite media file

25   broadcasting program broadcasting control system according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiment of the present invention will be discussed hereinafter in detail with reference to the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instance, well-known structures are not shown in detail in order to unnecessary obscure the present invention.

At first, outline of the present invention will be discussed.

A composite media file broadcasting program broadcasting control system according to the present invention is constructed with an organizing unit which manages program frames and time frame for CM in the program frame, a producing unit producing composite media file to be broadcasted and a broadcasting schedule information of the produced composite media file, a broadcasting unit preparing broadcasting data according to the broadcasting schedule information provided from the organizing unit and the producing unit and feeding the broadcasting data to a transmission path, a trigger input device commanding modification of the broadcasting data of the on-broadcasting program to the broadcasting unit, a schedule control unit concentrically managing

the organized schedule information map held by the
organizing unit, a composite media file modification
schedule information map and a file updating schedule
information map held by the producing unit, and a
5   storage device storing program information, a
broadcasting schedule information map and a time
information.

The broadcasting schedule information map stored
in the storage device will be hereinafter referred to as
10   data broadcasting schedule information map
distinguishing from that held by the producing unit.

In the storage device, broadcasting start timing
contained in each hierarchy of data broadcasting
schedule information map is expressed by a time
15   identifier. Detailed time information is managed by a
time information storage portion independently of the
broadcasting schedule information. The time identifier
expresses one point on a time axis solely present per
program/ When the same time is expressed, the same time
20   identifier as the broadcasting start timing of the
broadcasting schedule information is set.

The time information is stored in a form of a
time object expressing a time and an attribute
information of the map (which will be referred to as
25   time object map). The time object and the attribute
value can be retrieved from corresponding time
identifier set in the broadcasting schedule information.

The time object is established as an object of the expressing method the time for the purpose of extension for adaptation to the case where employment of new time becomes necessary. In the current employment

5   method, three kinds of time objects are defined. Types of the time object may be a fixed time type expressing a real time value (relative time from program starting), a range designation type expressing a time as one point in a certain time range, and an offset designation type

10 expressing the time in a form determined in association with other time information.

The schedule control unit has time information output unit for outputting order information of these time objects. When a time object which is not judged

15 the order in time is present, it is output as not judged.

In the attribute information of each time object contained in the time object map, corresponding time identifier, kind of the unit determining broadcasting start timing expressing the time object (organizing unit

20 or producing unit), time identification (in the case where the time object is range designation type, kind of trigger input device fixing undetermined broadcasting start timing), type of three kinds of time object and explanatory character string are contained. The

25 schedule control unit has a function for retrieving the time object using the attribute as key.

In the schedule control unit, the order

information of the time identifier by managing program

information, the broadcasting schedule information map

and time information and aggregate of file forming the

composite media file and other broadcasting control data

5   per time identifier by the broadcasting unit utilizing a

plurality of data broadcasting schedule information maps

presenting in hierarchy. Thus, broadcasting preparatory

process from the condition where the fixed broadcasting

start timing is not obtained, becomes possible.

10   This enables broadcasting preparatory process as

long as the order of the broadcasting start timing is

determined even when the broadcasting schedule

information map and untime broadcasting schedule

information where the broadcasting start timing is

15   undetermined are admixingly present.

When the untime broadcasting schedule

information undeterminable of order of the broadcasting

start timing is present, judgment is made whether

broadcasting preparatory process is possible or not in

20   order to distinguish from the broadcasting start timing

which is known the order.

On the other hand, since the broadcasting

schedule information map is held separately as a

plurality of data broadcasting schedule information maps

25   and time information independently and linearly

expressed. Therefore, even without tracing the

hierarchy of the broadcasting schedule information maps,

the broadcasting start timing can be obtained. The data
broadcasting schedule information map which is not set
real time value can be reused for reusing program.

Furthermore, shift of the broadcasting start
5 timing required for modification and reuse of the
broadcasting start timing of the program can be realized
by simple process by modification of the time object.

In addition to three kinds of time objects as
defined above, new time object is defined. This will be
10 referred to as association type time object which
expressed one point in a time range after a given time
from other time object and
before a certain time. These are two screen varying
timing determined by a trigger in a manner that only
15 after one screen variation, the other screen variation
can be done. Namely, when one time is determined in
association with the other time, variation timing of the
screen is determined in association.

Using four kinds of time objects, aggregate of
20 the variation timing of the screen is expressed.

Furthermore, time classification code is added
in attribute information of the time object having the
time object map. The time classification code is a
numerical value added to a certain time range. The time
25 object having the time classification code in attribute
expresses a time within a given time range. Utilizing
the attribute value, the time object to be used in one

program can be divided into several partial aggregates.
Usage of the time classification code is different
depending upon operation. Here, it is assumed that the
greater value expresses later partial aggregate.

5 (1) First Embodiment

In the first embodiment of the composite media
file broadcasting program broadcasting control system
according to the present invention, in broadcasting of
data broadcasting program cooperated with line

10 broadcasting program, modification of the broadcasting
data during on air is commanded by the operator through
operation of the trigger input device. Quickly
responding to the designated time, broadcasting of the
program is controlled so that the modified composite

15 media file can be broadcasted.

Fig. 1 is a block diagram showing a construction
of the first embodiment of the composite media file
broadcasting program broadcasting control system
according to the present invention. The shown

20 embodiment of the composite media file broadcasting
program broadcasting control system is mainly
constructed with an organizing unit 100, a producing
unit 110, a broadcasting unit 120, a schedule control
unit 130, a storage device 140 and a trigger input

25 device 150.

The organizing unit 100 prepares an organized
schedule information map indicating broadcasting

schedule information per program frame and per time frame of CM in the program frame. The organized schedule information map is input to the schedule control unit 130 by organized schedule information map

5   input unit 101.

The producing unit 110 obtains a broadcasting schedule information map based on the organized schedule information map prepared by the organizing unit 100, from the schedule control unit 130 to assign the

10   composite media file to be actually broadcasted to each time frame indicated in the obtained broadcasting schedule information map. At this time, the composite media file modification schedule information map and the file updating schedule information map of each

15   constituent files forming the composite media file are also prepared. These broadcasting schedule information maps are input to the schedule control unit 130 by the composite media file modification schedule information map input unit 111.

20   The schedule control unit 130 is a unit unitarily manage the broadcasting schedule information of respective devices and units. The schedule control unit 130 includes a broadcasting schedule information map registering unit 131, the broadcasting schedule

25   information map output unit 132 and a time information output unit 133.

The broadcasting schedule information map

registering unit 131 uniquely assigns program identifier

for management by storing attribute information (start

time of the program frame, end time, program name and so

forth) of the program input from the organizing unit 100

5   and the program identifier as a program information, in

a program information storage portion 143. Furthermore,

the broadcasting schedule information map registering

unit 131 prepares data broadcasting schedule information

map and a time object map expressing the real time value

10   of the broadcasting start timing and attribute thereof

from the broadcasting schedule information map input

from the organized schedule information map input unit

101 and the composite media file modification schedule

information map and file updating schedule information

15   map input unit 111, through processes, such as assigning

the program identifier, replacing the broadcasting start

timing with the time identifier and so forth. The data

broadcasting schedule information map is stored in the

broadcasting schedule information map storage portion

20   141. On the other hand, the time object map is stored

in a time information storage portion 142.

The broadcasting schedule information map output

unit 132 outputs the data broadcasting schedule

information map of the program to be objective from the

25   program associated information.

The time information output unit 133 outputs an

order information of the time objects on a time axis and

the time object map.

The broadcasting unit 120 is constructed with a unitary broadcasting schedule information map generating unit 121, broadcasting preparing unit 122 and composite

5 media file broadcasting unit 123 for performing broadcasting of the composite media file according to the broadcasting schedule information map generated by the organizing unit 100 and the producing unit 110. The unitary broadcasting schedule information map generating

10 unit 121 obtains the broadcasting schedule information map relating to the program to be broadcasted from the broadcasting schedule information map output unit 132 and the order information of the time identifier to be used in the broadcasting schedule information map

15 obtained from the time information output unit 133 to generate the unitary broadcasting schedule information map necessary for broadcasting preparatory process. The broadcasting preparing unit 122 obtains broadcasting content from a produced contents server (not shown) on

20 the basis of the unitary broadcasting schedule information map generated by the unitary broadcasting schedule information map generating unit 121 and performs broadcasting preparatory process, such as processing of the broadcasting content into the

25 broadcasting data format and generation of broadcasting control data. The composite media file broadcasting unit 123 performs broadcasting of the broadcasting data

prepared per designated time.

The trigger input device 150 is constructed with
a broadcasting data modification trigger input device
151 and a broadcasting data modification trigger input
5   device 152 which provide command for modification of the
broadcasting data in case of untime broadcasting to the
broadcasting unit 120. Here, the reason why two
broadcasting data modification trigger input devices are
provided in the trigger input device 150, is for
10 possibility of application of the command from different
device depending upon nature of modification of the
broadcasting data. For example, modification of the
broadcasting contents relating to CM and modification of
the display content for the program are likely to be
15 triggered by different devices.

The storage device 140 is constructed with a
broadcasting schedule information map storage portion
141, a time information storage portion 142 and a
program information storage portion 143.

20   Examples of the program information stored in
the program information storage portion 143 and data
broadcasting schedule information map stored in the
broadcasting schedule information map storage portion
141 will be discussed later together with flow of the
25 process. Information stored in the program information
and the data broadcasting schedule information map is
variable depending upon operation method of the program

broadcasting. Therefore, it is not essential to follow the example which will be discussed later.

Entry of the time object map stored in the time information storage portion 142 is shown in Fig. 2.

5 Each entry of the time object map is set a pointer of the time object expressed by one point on respective time axis and an attribute information of the time object. In case of the shown embodiment, the attribute information is the five kinds of information of the time

10 identifier, the program identifier, manager, kind of time and explanatory character string.

The time identifier is a unique value of the program and is an identifier of the time object. The program identifier is a unique value assigned for the

15 program, with which the time object is used. The time identifier and the program identifier uniquely identify the broadcasting start timing as expressing object in combination.

The manager identifies a kind of unit which

20 generated the broadcasting schedule information map relating to the broadcasting start timing expressed by the time object. In case of the shown embodiment, the manager may be either the organizing unit 100 or the producing unit 110. The kind of time represents the

25 kind of the time object, and when the time is not determined, a value indicative of a kind of the device which fixes the time has to be set. The explanatory

character string is a value mainly used when the time is not determined and contains explanatory information relating to the time to be used for transmitting what is varied when the time is fixed, to the system fixing the time.

5

In Fig. 3, (b - 1), (b - 2) and (b - 3) express one point on a time axis in respective methods and referred to as time object.

There are three kinds of time objects.

10 Among three kinds of time object, in a time fixed type time object (see (b - 1) of Fig. 3), a relative time from a program start timing can be set. The broadcasting schedule information expressing a time by the time fixed type time object is a fixed

15 broadcasting schedule information. In a range designation type time object (see (b - 2) of Fig. 3), the time is expressed as one point in a certain time range which is used for expressing the broadcasting schedule information for the content which has

20 undetermined broadcasting start timing, namely for expressing the untime broadcasting schedule information. To the range designation type time object, the start time and end time of the time range within which the time of the time object can be fixed, can be set. As

25 the start time and end time, either a relative time from the program start timing or other time identifier may be set. In an offset designation type time object (see (b

- 3) of Fig. 3), an offset objective time identifier and an offset time can be set for expressing the time in a manner of a relative time from the timing corresponding to the offset objective time identifier. This is used

5 for expressing the broadcasting schedule information in corporation with other broadcasting schedule information, such as starting broadcasting after 20 seconds from starting CM.

   With the construction set forth above,
10 hierarchically presenting plurality of broadcasting schedule information maps registered by the organizing unit 100 and the producing unit 110 can be separated into the program information, the broadcasting schedule information map and the time information to be stored in
15 the program information storage portion 143, the broadcasting schedule information map storage portion 141 and the time information storage portion 142.

   In the storage device 140, the broadcasting start timing contained in the data broadcasting schedule
20 information map in each hierarchical level is expressed by the time identifier. The detailed time information is managed by the time information storage portion independently of the broadcasting schedule information. The time identifier expressed one point on the time axis
25 uniquely present per the program. When the same timing is expressed, the same time identifier is set at the broadcasting start timing of the broadcasting schedule

information.

On the other hand, the time information is
stored in a form a map of the time object expressing the
time and its attribute information (time object map).

5   From the time identifier set in the broadcasting
schedule information, the time object and its attribute
information can be retrieved. The time object is a
expression method established as an object intending to
extension ability adapting to the case new time

10   operation method becomes necessary. In the current
operation method, the foregoing three time objects are
defined. Namely, the time fixed type expressing the
real time value (relative time from starting program),
the range designation type expressing the time as one

15   point in a certain time range, and an offset designation
type expressing the time determined in association with
other time information.

The broadcasting schedule information map output
unit 132 outputs the data broadcasting schedule

20   information map pf the objective program from input
information relating to the program. The broadcasting
schedule information map output unit 132 collates the
input program information with the program information
stored in the program information storage portion 143 to

25   obtain the program identifier to be an object. Also,
the data broadcasting schedule information map in which
the relevant program identifier is set is obtained from

the broadcasting schedule information map storage portion 141.

The time information output unit 133 mainly outputs two information. One is an order of the time

5   object in which one program belong. The order is derived from the time information contained in each kind of time object and output in a form of a list of the time identifier. It should be noted that there are some time object whose order is indefinite, such as the case

10 where the time range to be expressed by the range designation type time object extends over the entire program. Therefore, the time object whose order is indefinite is discriminated from those having definite order and output as separate time identifier list.

15   The other is to filter the time object map stored in the time information storage portion 143 as required for outputting the time object map for particular demand. Filtering is performed using the attribute value set in the time object map. Accordingly,

20 the time object map separated depending upon the program identifier, the time identifier, the manager and the kind of time. For example, the time object map, such as "time object map containing program identifier being 10 and the manager being organizing unit" or "fixed time

25 object map containing program identifier being 20" can be output. Of course, it is also possible to output one entry of the time object map using the program

identifier and the time identifier.

Next, operation of the first embodiment of the composite media file broadcasting program broadcasting control system constructed as set forth above will be

5 discussed,

Here, in the first embodiment, flow of broadcasting control from assignment of the program frame for certain program to broadcasting of the broadcasting data will be discussed together with an

10 example of broadcasting schedule information map generated by respective units and the data broadcasting schedule information map stored in the storage device 140 by the schedule control unit 130, with reference to the drawings. the broadcasting schedule information map

15 in the condition stored in the storage device 140 will be referred to as data broadcasting schedule information map for distinction.

Fig. 4 is a flowchart showing the broadcasting control process in respective unit in the first

20 embodiment of the composite media file broadcasting program broadcasting control system.

Step 101:

At first, in the organizing unit 100, new program is registered. At this time, the organizing

25 unit 100 inputs the program information and organized schedule information map to the schedule control unit 130 from the organized schedule information map input

unit 101.

Here, one example of the program information is
shown in Fig. 5 and one example of the organized
schedule information map is illustrated in Fog. 6. In
5   the program information shown in Fig. 5, a broadcasting
station identifier (identification number of a
broadcasting station), the program start timing, the
program end timing, the program title and other
additional information are set. In the organized
10 schedule information map, the broadcasting start time
per time frame, broadcasting continuation period, the
identification number (common number for respective unit
and indicative of a position of the composite media file
as the object for broadcasting), kind of program/CM, the
15 untime attribute and additional information, such as
title of the time frame, explanatory character string
and so forth are described. The untime attribute is a
value for discriminating one having fixed broadcasting
start timing in the time frame or one having the
20 broadcasting start timing determined during on air, in
which "fixed" represents that the broadcasting start
timing is fixed, "offset" represents that the
broadcasting start timing is determined in association
with the other broadcasting start timing, "insert (1)"
25 represents that the broadcasting data modification
trigger input device 151 determines the broadcasting
start timing, and "insert (2)" represents that the

broadcasting data modification trigger input device 152 determines the broadcasting start timing.

Step S102:

In the schedule control unit 130, the

5 broadcasting schedule information map registering unit 131 assigns the number to be the program identifier uniquely in the broadcasting station (in the shown case 33). With establishing correspondence of the program identifier and the program information of Fig. 5, the

10 broadcasting start timing is stored in the program information storage portion 143. The program information to be stored is shown in Fig. 7.

Next, the broadcasting schedule information map registering unit 131 assign the time identifier unique

15 to the program per time frame of the organized schedule information map and generates data broadcasting schedule information map (hierarchy 1) from the organized schedule information map (see Fig. 8) to store in the broadcasting schedule information map storage portion

20 141. The data broadcasting schedule information map is generated by replacing the broadcasting start timing of the organized schedule information map with the time identifier, removing the untime attribute for expressing by the time object map and creating a region for a point

25 to the broadcasting schedule information map of the lower hierarchical level. In the pointer region, no value is set.

Furthermore, the broadcasting schedule
information map registering unit 131 generates the time
object per time frame of the organized schedule
information map and generates a time object map set

5   attribute information, such as corresponding time
identifier or the like for storing in the time
information storage portion 142. The time object
generated at this point and the time object map are
shown in Fig. 9. Kind of the time object thus generated

10   is determined depending upon the untime attribute of the
organized schedule information map. In case of "fixed",
the time fixed time object is generated and the
broadcasting start timing is converted into a program
relative time and set. In case of "offset", the offset

15   designation type time object is generated to set the
time identifier and the offset time to be object for
offset. In the shown embodiment, offset is considered
as an offset from the preceding time frame. Then, in
the offset designation type time object corresponding to

20   the broadcasting start timing of the time frame (time
identifier "CM-AIU" having a title of "AIU Motors", the
time identifier "CM-IROHA" set at the broadcasting start
timing of the time frame having a title of "IROHA
Cosmetics" is set as offset objective time identifier.

25   A broadcasting continuing period 20 seconds of the
"IROHA cosmetics" is set as offset time. In case of
"insert (1)" and "insert 2", the range designation type

time object is generated. At this time, when the time
value is set in the broadcasting start timing, the time
value is considered to indicate a broadcasting target
time. In the shown embodiment, a timing 10 seconds

5   ahead of the broadcasting target time is set as start
time of the time range and a timing 10 seconds after
broadcasting target time is set as end time of the time
range.

Step S103:

10   The producing unit 110 obtains the data
broadcasting schedule information map (hierarchy 1) (see
Fig. 8) from the broadcasting schedule information map
output unit 132.

Step S104:

15   Next, the producing unit 110 generates the
composite media file modification schedule information
map corresponding to each time frame of the obtained
data broadcasting schedule information map to input to
the schedule control unit 130 by the composite media

20   file modification schedule information map input unit
111. Here, the information input to the schedule
control unit 130 is the file modification schedule
information map, the corresponding program identifier,
the time identifier corresponding to the composite media

25   file modification schedule information map, the
objective composite media file name and an objective
file name. By this, the schedule control unit 130 may

know connection between the broadcasting schedule
information maps.

Fig. 10 shows one example of the composite media
file modification schedule information map provided from
the producing unit 110. The composite media file
modification schedule information map represents the
broadcasting schedule information map, in which the
composite media file is varied significantly, namely
significant visual change is caused, in the time frame
of the organized schedule information map. Fig. 10 is
an example of the composite media file modification
schedule information map corresponding to the time
identifier "Q-START" in Fig. 8. In Fig. 10, composite
media file of the names, such as "opening",
"introduction" and "Q1-question" and so forth per time
frame is scheduled for broadcasting.

In the example of the composite media file
modification schedule information map of Fig. 10,
attributes consisted of the broadcasting start timing
expressed by the relative time of the time frame of the
organized schedule information map, the broadcasting
continuing time, a production identification number, an
untime attribute (used in the same meaning of organized
schedule information map), the composite media file name,
an explanatory character string, and constituent file
list. The production identification number is a content
number of the composite media file managed in the

producing unit 110. Actually, in addition to these,
control information necessary for broadcasting may be
added. However, discussion for such additional control
information will be eliminated for not essential to the
5   present invention.

The broadcasting schedule information map input
from the producing unit 110 is not only the composite
media file modification schedule information map. The
composite media file is consisted of a plurality of
10   constituent files. Contents of the individual files is
updated without changing the file name between the time
frames of the composite media file modification schedule
information. A table of the updated broadcasting
schedule information is the file updating schedule
15   information map. The file updating schedule information
map will be discussed in greater detail. In the file
updating schedule information map, the broadcasting
start timing (expressed by a relative time in the time
frame of the composite media file modification schedule
20   information map) and file position, in which the actual
content of the file started broadcasting at the relevant
timing is stored, are contained. For example, in Fig.
10, when the composite media file named "Q1-question" is
consisted of four files of startup. html, back.jpg,
25   button. jpg and button2.jpg, the file updating schedule
information map is present per file. One example is
shown in Figs. 11 to 14. When the composite media file

is broadcasted according to the broadcasting schedule

information map, after one minutes from starting

broadcasting (see Fig. 15), the form of the button is

varied (see Fig. 16), and after two minutes, the

5   background image and another button are varied (see Fig.

17).

Step S105:

In the schedule control unit 130, after

inputting of the composite media file modification

10   schedule information map and the file updating schedule

information map, the broadcasting schedule information

map registering unit 131 assigns the time identifier

unique to the program per time frame of the composite

media file modification schedule information map to

15   generate the data broadcasting schedule information map

(hierarchy 2) (see Fig. 18) from the composite media

file broadcasting schedule information map to register

in the broadcasting schedule information map storage

portion 141. At this time, to the pointer to the

20   broadcasting schedule information map of the lower

hierarchical level of the time frame to be object of the

broadcasting schedule information map (hierarchy 1), the

pointer information to the generated data broadcasting

schedule information map (hierarchy 2) is set. A

25   condition where the pointer is set to the data

broadcasting schedule information map shown in Fig. 8 is

shown in Fig. 19.

The data broadcasting schedule information map
(hierarchy 2) assigns the program identifier similar to
the organized schedule information map, removes the
untime attribute to generate the region of the pointer
5   to the broadcasting schedule information of the lower
hierarchical level per constituent file forming the
composite media file. The broadcasting start timing
initially indicated in the composite media file
modification schedule information map is the same as the
10 broadcasting start timing of the time frame of the
organized schedule information map. Therefore, the time
identifier as the time identifier set in the organized
schedule information map is set.

Next, the broadcasting schedule information map
15 registering unit 131 generates the time object
corresponding per time frame of the composite media file
modification schedule information map to register in the
time information storage portion 142 (wherein the time
object corresponding to the initial time frame in time
20 among the map set forth above has already generated and
is not newly generated).

Subsequently, the broadcasting schedule
information map registering unit 131 assigns the time
identifier similar time identifier concerning the file
25 updating schedule information map to generate the data
broadcasting schedule information map (hierarchy 3) (see
Figs. 20, 21, 22 and 23) to register in the broadcasting

schedule information map storage portion 141. Then, the pointer information to the registered data broadcasting schedule information map (hierarchy 3) is registered in the data broadcasting schedule information map

5 (hierarchy 2) (see Fig. 18).

Here, when the broadcasting start timing is the same in different file updating schedule information maps, attention has to be paid in assigning the time identifier. As can be seen from Figs. 12 and 14,

10 back.jpg and back2.jpg have the same update timing. In such case, the same time in the different file updating schedule information maps can be realized by setting the same time identifier.

Furthermore, the broadcasting schedule

15 information map registering unit 131 generate the time object per newly generated time identifier to register in the time information storage portion 142. Then, all time information relating to the program is registered. In this example, all registered time object map is shown

20 in Fig. 24.

The broadcasting unit 120 performs broadcasting of the composite media file according to the program information, the broadcasting schedule information map and the time information registered in the storage

25 device 140 in the foregoing process.

Step S106:

In the broadcasting unit 120, the unitary

broadcasting schedule information map generating unit
121 obtains the all data broadcasting schedule
information map relating to the program to be object for
broadcasting (see Figs, 8, 18, 20, 21, 22 and 23).

5 Step S107:

Next, the unitary broadcasting schedule
information map generating unit 121 obtains the order
information of all time identifiers used in the program
by the time information output unit 133 (step S107). At

10 this time, in the schedule control unit 130, the order
information is derived from the value of the time object.
In case of the program handled in the shown embodiment,
as shown in Fig. 24, since there is no overlapping of
the time information expressed by the time object, order

15 of all time identifier can be derived. The order
information of the time identifiers obtained herein is
shown in Fig. 25.

Step S108:

Subsequently, the unitary broadcasting schedule

20 information map generating unit 121 generates the
unitary broadcasting schedule information map using the
data broadcasting schedule information map obtained at
step S106 and the order information of the time
identifier obtained at step S107. Fig. 26 shows the

25 unitary broadcasting schedule information map generated
herein. The unitary broadcasting schedule information
map expresses the file position of the aggregate of the

constituent files forming the composite media file and

the broadcasting control information broadcasted at the

timing, per time identifier sorted in order of the

timing and enables broadcasting preparatory process.

5   Here, if the context of the broadcasting start timing in

the file updating schedule information map is not

definite, the aggregate of the files to be broadcasted

at each broadcasting start timing cannot be obtained

correctly. In case of the shown example, the file

10   updating schedule information with undetermined

broadcasting start timing is present in the file

updating schedule information map shown in Fig. 13.

Watching the data broadcasting schedule information map

(hierarchy 3) corresponding to the file updating

15   schedule information map shown in Fig. 22, it can be

appreciated that the time identifier "Q - Q1Q - 2" is

assigned for this timing. Furthermore, as can be seen

from Fig. 24, the value set in the range designation

type time object corresponding to the time identifier "

20   Q - Q1Q - 2" is that the start timing is 5'55" (5

minutes and 55 seconds) and the end timing is 6'10/ The

time and the time range expressed by other time object

does not overlap within a period from 5'5"" to 6'10".

Therefore, order information of all time identifiers can

25   be derived to enable generation of the unitary

broadcasting schedule information map.

Step S109:

The broadcasting preparing unit 122 performs broadcasting preparatory process on the basis of the unitary broadcasting schedule information map obtained at step S108. Here, the broadcasting preparatory

5   process is obtaining of the broadcasting file from the produced content server, processing of the broadcasting file into the broadcasting data format and generation of the broadcasting control data and so forth. In this condition, in the broadcasting unit 120, mapping of the

10   time identifier and the broadcasting data is established. Step S110:

Next, the broadcasting preparing unit 122 obtains the time fixed type time object map (see Fig. 27) and the offset designation type time object (see Fig.

15   28) from the time information output unit 133. Here, the time object maps are obtained separately per the kind of time of the time object map.

The broadcasting start timing obtained by the time fixed type time object map and the broadcasting

20   data prepared at step S109 are mapped with the time identifier. The value of the offset designation type time object map is held since it becomes necessary during broadcasting of the program. Step S111:

25   In the trigger input device 150, the broadcasting data modification trigger input device 151 obtains the range designation type time object map (see

Fig. 29) as the "insert (1)" of the kind of time to display an user interface prompting trigger input of the operation based thereon (see Fig. 31). On the other hand, the broadcasting data modification trigger input

5   device 152 obtains the range designated type time object map as "insert (2)" of the kind of time (see Fig. 30) to display an user interface prompting trigger input of the operation based thereon (see Fig. 31). In the user interface, it is possible to take a measure to permit

10   trigger input only during the time range expressed by the time object.

Step S112:

    In the broadcasting unit 120, the composite media file broadcasting unit 123 broadcasts the

15   corresponding broadcasting data at the broadcasting time set in the time fixed type time object (see Fig. 27).

Step S113:

    The broadcasting data modification trigger input device 151 and the broadcasting data modification

20   trigger input device 152 transmits the fixed broadcasting start timing and the objective time identifier to the broadcasting unit 120 when the operator fixes the broadcasting start timing.

    The process of the untime broadcasting process

25   (trigger responsive process) of the broadcasting unit 120 when this information is transferred will be shown in Fig. 32.

Step S201:

In the broadcasting unit 120, the composite media file broadcasting unit 123 receives the trigger containing the broadcasting start timing and the time identifier.

5

Step S202:

Next, the composite media file broadcasting unit 123 checks whether the designated time identifier matches the time identifier of the range designation type time object map (see Figs. 29 and 30) held in the broadcasting unit 120.

10

Step S203:

If matching time identifier is present, the composite media file broadcasting unit 123 checks whether the designated broadcasting start timing falls within the range of time of the time object.

15

Step S204:

If the broadcasting start timing falls within the time range of the time object, the composite media file broadcasting unit 123 performs broadcasting process of the broadcasting data corresponding to the time identified at the designated time.

20

Step S205:

Next, the composite media file broadcasting unit 123 checks whether the designated time identifier matches with the offset objective time identifier of the offset designation type time object map (see Fig. 28).

25

Step S206:

When the designated time identifier matches with the offset objective time identifier of the offset designation type time object, the composite media file

5 broadcasting unit 123 derives the broadcasting start timing by adding the offset time to the designated broadcasting start timing to perform broadcasting process of the broadcasting data corresponding to the time identifier of the offset type time object at the

10 derived broadcasting start timing.

The broadcasting unit 120 ignores the trigger when the foregoing condition is not satisfied.

As set forth above, the broadcasting start timing is expressed independently of the broadcasting

15 schedule information map and provided the function for expressing the order information of the time for enabling the broadcasting preparatory process of the untime broadcasting schedule information. Therefore, the broadcasting unit 120 is quickly responsive to the

20 trigger for the broadcasting data modification from the trigger input device 150.

With the first embodiment of the composite media file broadcasting program broadcasting control system, in the schedule control unit 130, by managing the

25 broadcasting schedule information and the time information, time relationship between a plurality of the broadcasting schedule information in hierarchy can

be expressed without depending upon real time value. By this, a plurality of broadcasting schedule information can be united into one. Furthermore, modification of the file updating schedule information in time can be

5 easily adapted. In addition, since it maintains the form of hierarchical broadcasting schedule information, it can be adapted to exchanging of aggregates in meaning and erasure, easily. Furthermore, by providing new time values per aggregates in the meaning, it can be used in

10 another program to improve reusing ability of the contents.

On the other hand, the time axis, on which all broadcasting schedule information presenting in one program can be expressed, is expressed by one, the time

15 information can be obtained easily.

Furthermore, since the time information is expressed independently of the broadcasting schedule information, the broadcasting schedule information can be generated even in the condition where the time is not

20 determined. Even in such condition, broadcasting preparatory process using only broadcasting schedule information becomes possible. On the other hand, even when the broadcasting control along the broadcasting schedule information admixed with the untime

25 broadcasting schedule information which is determined the broadcasting start timing after starting broadcasting, there is no influence for the expressing

method of the broadcasting schedule information.

Therefore, adaptation to the broadcasting preparatory

process or the like can be done similar to the case

where all are fixed broadcasting schedule information.

5   Conversely, the broadcasting unit 120 can handle

the fixed broadcasting schedule information and the

untime broadcasting schedule information separately, and

can execute the broadcasting process separately per

obtained broadcasting schedule information. Furthermore,

10   a time designation schedule table required in the

trigger input device 150 designating the undetermined

broadcasting start timing, can be obtained from the

schedule control unit 130.

(Second Embodiment)

15   The second embodiment of the composite media

file broadcasting program broadcasting control system

according to the present invention is constructed

similarly to the first embodiment of the composite media

file broadcasting program broadcasting control system.

20   Accordingly, the construction will not be discussed

redundantly. In the second embodiment, similar to the

first embodiment, man operates the trigger input device

150 for modification of the broadcasting data in

broadcasting to perform broadcasting control of the

25   program so that broadcasting of the modified composite

media file in quickly responding to the designed

broadcasting start timing. What is different in the

second embodiment from the first embodiment is the order

of the time object belonging in one program is not

derived partially. Untime broadcasting of information

in such a manner can be performed in the case where the

5   prepared composite media file is undeterminable whether

it is to be broadcasted or not or CM has to be replaced

in emergency basis.

In this case, even when the context of the time

objects cannot be known, it is possible that

10   broadcasting preparatory process becomes impossible but

possible in certain case. In the second embodiment,

discussion will be given for a method to discriminate

whether broadcasting preparatory process is possible or

not and a control method for broadcasting in the case

15   that broadcasting preparatory process is possible.

Whether broadcasting preparatory process is

possible or not can be judged depending upon whether

information expressing context of the broadcasting start

timing in each time frame is set or not, in the file

20   updating schedule information. Discussion will be given

with example.

For example, it is assumed that a time frame no

set the broadcasting target time is present at

broadcasting start timing in the organized schedule

25   information map. Fig. 33 shows one example. In Fig. 33,

the organized schedule information map where title is

"BB broadcasting station" and "emergency CM" expresses

CM to be inserted upon emergency. Since it is not determinable when it is broadcasted in the program, the broadcasting target time is not set in the broadcasting start timing. For explanation, the composite media file

5　modification schedule information map of "BB broadcasting station" is shown in Fig. 34, the file updating schedule information map is shown in Figs. 35, 36 and 27. In these broadcasting schedule information map, the time frame, in which the broadcasting target

10　time is not set in the broadcasting start timing, is not present.

　　Adapting to the broadcasting schedule information map exemplified in Figs. 34, 35, 36 and 37, the data broadcasting schedule information map

15　(hierarchy 1) stored in the broadcasting schedule information map storage portion 141 is shown in Fig. 38. The data broadcasting schedule information map (hierarchy 2) is shown in Fig. 39, the data broadcasting schedule information map (hierarchy 3) is shown in Figs.

20　40, 41 and 42. Such information format is nothing different from the first embodiment. In the time object map (see Fig. 43) stored in the time information storage portion 142, two range designation type time objects are present set the start timing 00:00:00 and end timing at

25　program end timing 01:00:00. In the second embodiment, the range designation type time object set the program start timing and the program end timing expresses the

broadcasting start timing of the untime broadcasting schedule, start timing of which is not known.

The broadcasting unit 120 can be judged whether broadcasting preparatory process from the broadcasting

5   schedule information map and the time object map can be performed. In the time object map shown in Fig. 43, the time object expressing the time, start timing of which is not known, is the time object having time identifier of "CM-BB" and "CM-GOV". Since the manager of the these

10   time identifiers are organizing unit 100 and it is not the updating timing of the file updating schedule information, it can be appreciated that broadcasting preparatory process is possible. When the manager of the time object expressing the undetermined timing for

15   broadcasting is the time identifier appearing only in the data broadcasting schedule information map (hierarchy 3), is the producing unit 110, broadcasting preparatory process is impossible.

In the broadcasting preparatory process, the

20   order information of the time identifier is required. Here, the order information of the time identifier is output as a list (see Fig. 44) of the time identifier known the order shown in Figs. 44, 45 and 46 and as a list (see Figs. 45 and 46) of the time identifier order

25   of which is not known. The order information of the time identifier not known the order is obtained in a form of a list of the time identifier not known the

order and the time identifier (if any) of the offset
designation type time object taking that time identifier
as offset object/

In the shown example, the time identifier "CM-
BB" and "CM-GOV" are not known the order in the overall
schedule but are timing not expressing the file updating
timing of the file updating schedule information.
Therefore, obtaining of aggregate of the files of the
composite media file started broadcasting at that timing
becomes possible. Accordingly, generation of the
unitary broadcasting schedule information map shown in
Fig. 47 becomes possible. By performing broadcasting
preparatory process based thereon, broadcasting
according to the fixed broadcasting start timing and
broadcasting according to designation of the
broadcasting data modification from the trigger input
device 150 can be realized in similar manner as the
first embodiment.

(3) Third Embodiment

In the shown embodiment, three kinds of time
objects of the time fixed type, the range designation
type and offset designation type shown by (b - 1) to (b
- 3) of Fig. 3 performing broadcasting of the program
realizing broadcasting schedule information using four
kinds of the time object by adding association type time
object.

At first, discussion will be given for the kind

of programs to be enabled by each time object. Then,
time order judgment method of the time object will be
discussed. If judgment of order of the time objects
becomes possible, capability of broadcasting control in
5 the similar manner as the first and second embodiment
can be proven.

Fig. 48 shows a data construction of the
association type time object. The association type time
object expresses one point in a range from a timing
10 derived by adding a value set in "start relative time"
to the time object having identifier set in "association
objective time identifier" to a timing of the time value
or time object having the time identifier designated in
"end timing or time identifier".

15 By employing four kinds of time objects, the
following broadcasting schedule information of the
program can be expressed. Broadcasting control of the
program becomes possible:

a. data broadcasting program all screen varying
20 timing being fixed;

b. data broadcasting program, for which trigger
being applied from the trigger input device 150 between
a certain time range to change screen image;

c. data broadcasting program change of screen image
25 being taken place after a given period from certain
trigger; and

d. data broadcasting program change of screen image

being taken place when trigger is applied from trigger

input device 150 within a time range after a given

period from a certain trigger and before a certain

timing; and

5   e.   data broadcasting program in which four kinds of

screen image modification of a, b, c and d are present

in admixing manner.

a represents the program, in which modification

of screen image in the program is taken place at all

10   fixed timing. As the time object for such program, only

one kind of the time fixed type time object is employed

as the time object.

b represents the program, in which modification

of the screen image is taken place at a fixed timing or

15   in response to the trigger. As the time object relating

to this program, two kinds of time objects, i.e. time

fixed type time object and the range designation type

time object are employed.

c represents the program, in which modification

20   of screen image in the program is taken place at fixed

timing, in response to the trigger or automatically

after a given period from trigger timing. As the time

objects, three kinds of time objects, i.e. the time

fixed type time object, the range designation type time

25   object and the offset designation type time object are

employed.

The following is particular example. When a set

of commercial messages started at the timing of trigger

and broadcasting period of each commercial message is 15

seconds, start timing of the first commercial message is

determined using the range designation type time object.

5   Start timings of the second and subsequent commercial

messages are determined using the offset designation

type time object As the offset objective time

identifier of the offset designation type time object,

the identifier of the time object employed for the start

10   timing of the first commercial message is set. As the

offset period, values of 15 seconds, 30 seconds and so

forth are set.

d represents the program, in which modification

of the screen image performed relative to other

15   modification of the screen image. As the time object

relating to this program , three kinds of time objects,

i.e. the time fixed type time object, the range

designation type time object and the association type

time object are employed.

20   As particular example, the question contents and

answer contents in quiz program. When both of the

question contents and the answer contents are started to

display by the timing of trigger, it expresses that the

answer content must not be displayed before the question

25   contents. Therefore, as the time object for the answer

contents, the association type time object is employed.

As the association objective time identifier of the

association type time object, the identifier of the time object to be employed for the display start timing of the question contents is set. The start relative time is set for a period to maintain the question content on

5   the display. Furthermore, as the end timing, a time limit to display the answer content or the time identifier expressing the display start timing of the next question content is set, for example.

e represents the program, for which four kinds

10   of time objects, i.e. the time fixed type time object, the range designation type time object, the offset designation type time object and the association type time object.

What is subject to broadcasting control in the

15   shown embodiment is the program e. The program e uses all of four kinds of time objects. A system which can perform the broadcasting control for program e can perform broadcasting control for all programs of a to e.

Discussion will be given in detail for the order

20   judgment process of the aggregate of the time objects by the time information output unit 133 in the schedule control unit 130 when the foregoing four kinds of time objects are present in admixing manner. For judgment "Topological Sorting Theory" (see "C-data Structure and

25   Program" written by Lender Ammeraal, translated by Hironori Koyama, Chapter 8, Ohme K.K.) may be applicable. Flow of the order judgment process is as

shown in Fig. 49. The order judgment process is
performed for all of time objects belonging in the
objective program to be broadcasted.

Step S301:

5   The time information output unit 133 checks
whether the time object satisfies prerequisite for
performing order judgment.

Here, the prerequisite is as follows:

1.   There is no other time object expressing the
10 same timing as the certain time fixed type time object.

2.   When the time identifiers are used for the start
time and end time of the range designation type time
object, the time objects corresponding to the time
identifiers present in the aggregate of the time objects
15 to be object of the order judgment process.

3.   The time object corresponding to the offset
objective time identifier of the offset designation type
time object presents in the aggregate of the time
objects to be object of the order judgment process.

20 4.   The time object corresponding to the association
objective time identifier of the association type time
object, presents in the aggregate of the time objects
corresponding to the time identifier.

5.   When the time identifier is used for the end
25 time of the association type time object, the time
object corresponding to the time identifier presents in
the aggregate of the time objects to be object of the

order judgment process.

When the time object not corresponding to any one of the conditions is present, the time information output unit 133 terminates the process with judgment

5 that the program is not possible to make judgment of order.

Step S302:

When the aggregate of the time objects to be object comply with all prerequisites, the time

10 information output unit 133 derives the broadcasting time range of each time object. This indicates replacement of the range to be determined the time with the expression of the real time value.

Derivation of the broadcasting time range (start

15 time to end time) of each time object is performed in partially recursive manner as follow.

In case of the time fixed type time object, the expressed real time value (program relative time) becomes the start time and the end time.

20 In case of the range designation type time object, the broadcasting time range of the time object corresponding to the offset objective time identifier is derived (recurring), the offset time is added to convert into the real time value.

25 In case of the association type object, the broadcasting time range of the time object corresponding to the association objective time identifier is derived

(recurring) to obtain start time by adding the start relative time to the obtained start time. If the end time is the real time value, it becomes the end time as is. If the end time is the time identifier, the end

5 time is obtained by recurring process.

Here, in case of the aggregate of the time objects satisfying the prerequisite, the recurring process may not fall into endless loop. All time objects have attribute of start time to end time by the

10 foregoing process.

Step S303:

The time information output unit 133 selects an aggregate of the time objects to be sorted in order. This condition is designated using the entry value of

15 the time object map shown in Fig. 2. The subsequent process is performed for the aggregate of the time objects adapting to the designated condition.

Step S304:

The time information output unit 133 establishes

20 a graph of the aggregate of the time objects. The graph is a directed graph. Establishing of the graph is performed as follow.

1.   Node corresponding to each time object and the real time value set in the broadcasting time range of

25 the time object.

2.   Node establishes links for all nodes having greater value than own value. For example, when the

time identifier LABEL1 is set for the start time of the range designation type time object α, the time identifier LABEL2 is set for the end time, and the start time of the broadcasting range derived at step S302 is

5   0:00 and the end time is 0:30, to the node of α, link is established from nodes of the time objects corresponding to 0:00 and LABEL1. From the node of α, link is established to respective nodes of the time objects corresponding to 0:30 and LABEL2. It should be noted

10   that, in the node corresponding to the real time value, link is not established between all nodes but established with only nodes having adjacent values. Step S305:

     If links are established with all notes, the

15   time information output unit 133 performs topological sort. An output of the topological sort is an output of order (referred to as topological order which is not contradictory with presence or absence of closed path and direction of the link.

20   Closed path unit closing of links. When nodes are α, β and γ, links are established from α to β, β to γ and γ to α. The links thus established expresses order of the time. Therefore, presence of the closed path represents that the nodes are not aligned.

25   Accordingly, when the closed path is present, the time information output unit 133 makes judgment that the program is impossible to make judgment of order and

terminates the process.

Step S306:

However, even when closed path is not present, a plurality of topological orders may be present. For example, this is the case where the link is established from 0:00 and two nodes linked to 0:20 are present. In this case, while closed path is formed, two topological orders are present and order between two nodes cannot be determined.

Since the topological order corresponds to the order of the time objects, it represents that the order of the time objects cannot be determined univocal manner. Here, in order to derive univocally determined time object, for confirming that order of the nodes as the time objects is determined univocally among topological order obtained at step S305, the time information output unit 133 performs path retrieval in the graph. Among order of the nodes obtained by the topological sort, nodes corresponding to the time object are extracted to retrieve presence or absence of the route (route between the nodes tracing the link) between adjacent nodes. When the path is not present, it represents that a plurality of topological orders are present. According, the time information output unit 133 terminates the process with making judgment that the program is not possible to make judgment of the order.

When paths are present for all of adjacent nodes,

the time information output unit 133 outputs the obtained order of the nodes as time order of the time objects to terminate the process.

As set forth above, in the program having all of

5   four kinds of time objects, order of the time objects can be judged. Here, when the order can be fixed univocally, broadcasting control of the program can be performed in similar manner as the first and second embodiments.

10   In the schedule control device 130, concerning operation of the broadcasting unit 120 performing broadcasting of the program which is judged that judgment of order of the time object is not possible, discussion will be given in the following fourth

15   embodiment.

(4) Fourth Embodiment

In the shown embodiment, consideration is given for the case where each entry of the time object map is as shown in Fig. 50. In this case, comparing the case

20   of Fig. 2, "time classification code" as attribute value of the time object is added.

The time classification code is used for dividing the program broadcasting time into several time segments. For example, for the program from 7:00 to

25   8:00, the time classification code 1 is assigned from 7:00 to 7:20, the time classification code 2 is assigned from 7:20 to 7:40, and the time classification code 3 is

assigned from 7:40 to 8:00. Then attribute values 1, 2 and 3 of the time objects belonging in respective time segments are assigned.

Upon obtaining time object map and the order

5   information of the time object from the schedule control unit 130, it becomes possible to obtain only time objects having the same time classification code as the attribute value. Here, the value of the time classification code is ruled to assign greater value for

10   later timing.

In the schedule control unit 130, a function for selecting an aggregate of the time objects to perform broadcasting control using the time classification code is provided. Accordingly, the broadcasting unit 120

15   divides one program into several time segments for performing broadcasting process (see step S303). By this, even when the time objects "order judgment is possible" and "order judgment is impossible" are present in admixing manner, broadcasting becomes possible.

20   In this case, flow of the broadcasting control process in each unit is as shown in Fig. 51.
Step S401:

Generation and registering of the schedule information map by the organizing unit 100 and the

25   producing unit 110, and generation and registering of the broadcasting schedule information map, the time object and the time object map corresponding to the

registered schedule information map by the schedule

control unit 130 are performed. This is the same

process as steps S101 to S105 (see Fig. 4) in the first

embodiment.

5 Step S402:

The broadcasting unit 120 obtains all of the

data broadcasting schedule information map relating to

the program to be object for broadcasting. This is the

same process as the step S106 (see Fig. 4) in the first

10 embodiment.

Step S403:

The broadcasting unit 120 obtains the order

information of the time identifier having the same time

classification code.

15 Step S404, S405, S406:

When the judgment is made that judgment of order

of the time identifiers can be made, the broadcasting

unit 120 generates the unitary broadcasting schedule

information map on the basis of the obtained order

20 information to perform broadcasting preparatory process.

These processes are the same processes as steps S107 to

S109 (see Fig. 4). When judgment is made that the

judgment of order of the time identifier is not possible,

the broadcasting unit 120 does not perform broadcasting

25 preparatory process.

Step S407:

The broadcasting unit 120 respectively performs

the processes at steps S404, S405 and S406 for all time classification codes.

Step S408:

The trigger input device 150 obtains the range

5 designation type time object map and the association type time object map from the schedule control unit 130 to generate the user interface of the trigger input system.

Step S409:

10 After completion of all processes set forth above, the broadcasting unit 120 performs broadcasting process.

Flow of the broadcasting process at step S409 will be discussed with reference to Fig. 52.

15 Step S501:

A time of certain time object is fixed. When the time of the range designation type time object or the association type object is fixed by the trigger input, or δ minutes before the designated time of the

20 time fixed type time object, the process is initiated. δ is a unique value of the broadcasting unit 120 which is set slightly greater value than that required in modification of the broadcasting data.

Step S502, S503:

25 Concerning the time object to be object, if not preparation for broadcasting is not completed, the unitary broadcasting schedule information map generating

unit 121 generates the unitary broadcasting schedule

information map of the time object having the same time

classification object as the time object in question

(see Step S108). Here, when the range designation type

5 time object and the association type time object, for

which the time is not fixed, is present, such time

object is excluded.

Step S504:

The broadcasting preparing unit 122 performs

10 broadcasting preparatory process of the objective time

object using the unitary broadcasting schedule

information map thus generated.

Steps S505, S506, S507:

When fixing of the time at step S501 is made in

15 response to the trigger input, the composite medial file

broadcasting unit 123 performs a trigger responding

process through the process shown in Fig. 32. Otherwise,

the broadcasting data generated through the

broadcasting preparatory process is broadcasted at the

20 designated time.

Step S508:

The foregoing process is continued up to end of

the program.

As set forth above, if the time zone where the

25 order of screen image modification in one program is

fixed and time zone where the order is not fixed are

present, by assigning the different time classification

codes for respective time zones, broadcasting
preparatory process can be performed before broadcasting
of the program for the time zones with fixed order, and
broadcasting preparatory process is performed after

5   fixing of the time in the time zones with not fixed
order.

By performing the broadcasting preparatory
process before starting program, broadcasting data can
be modified instantly after fixing the time. Namely, it

10 becomes possible to perform broadcasting control
instantly responding to instruction of a person managing
the progress of the program (program director). In
contrast to this, when the broadcasting preparatory
process cannot be performed, a time lag in a period

15 corresponding to generation period of the broadcasting
data can be caused. With utilizing the time
classification code, even when portion where the order
of the time object cannot be fixed as a part of the
program, it can be avoided to make whole program becomes

20 impossible to subject to preparation process for
broadcasting.

(5) Fifth Embodiment

In the shown embodiment, discussion will be
given for broadcasting control method for the case where

25 when the broadcasting schedule information map output
unit 132 is extended in the schedule control unit 130.
The broadcasting schedule information map output unit

132 is provided with a function for outputting the data

broadcasting schedule information map associated with

the program as required. By extension, the broadcasting

schedule information map output unit 132 is provided

5   with a function for outputting data broadcasting

schedule information map in each hierarchical level

corresponding to the time identifier required. In he

embodiment not provided such function, the broadcasting

unit 120 units the aggregate of the time object obtained

10   from the time information output unit 133, their order

and the data broadcasting schedule information map under

the time identifier as common item to generate the

unitary broadcasting schedule information map to perform

broadcasting preparatory process. In the shown

15   embodiment, broadcasting preparatory process can be

performed without generating the unitary broadcasting

schedule information map.

Flow of the broadcasting control process in the

shown embodiment will be discussed with reference to Fig.

20   53.

Step S601:

Generation and registering of the broadcasting

schedule information map by the organizing unit 100 and

the producing unit 110 and generation and registration

25   of the data broadcasting schedule information map, the

time object and the time object map corresponding to the

registered broadcasting schedule information map are

performed. These are the same processes as those at
steps S101 to S105 (see Fig. 4) in the first embodiment.
Step S602:

In the broadcasting unit 120, the unitary

5   broadcasting schedule information map 121 obtains the
order information of the time identifier having the same
time classification code from the time information
output unit 133 in the schedule control unit 130.
Step S603, S604:

10 When judgment is made that judgment of the order
of the time identifier, the unitary broadcasting
schedule information map generating unit 121 provides
the order information of the time identifier to the
broadcasting schedule information map output unit 132 of

15 the schedule control unit 130 for obtaining the data
broadcasting schedule information corresponding to each
time identifier.

For example, the data broadcasting schedule
information map stored in the schedule control unit 130

20 are shown in Figs. 18, 19 and 20 to 23. When the time
identifiers are ordered as "Q - Q1Q", "Q - Q1Q - 2", "Q
- Q1Q -3", the broadcasting schedule information map
output unit 132 in the schedule control unit 130 outputs
the data broadcasting schedule information shown in Fig.

25 54 for the program identifier "33" and the time
identifier "Q - Q1Q - 2". Here, per the data
broadcasting schedule information map at each

hierarchical level, if the data broadcasting schedule information corresponding to the time identifier "Q - Q1Q - 2", the information corresponding to that time identifier is output. On the other hand, if the data

5 broadcasting schedule information corresponding to the time identifier is not present, the data broadcasting schedule information corresponding to the preceding time identifier closest to the time identifier "Q - Q1Q - 2" in time order, is output. The data broadcasting

10 schedule information this obtained is all data broadcasting schedule information necessary for generating the broadcasting data to be broadcasted at the timing identified by the time identifier "Q - Q1Q - 2".

15 Step S605:

The broadcasting preparing unit 122 performs broadcasting preparatory process on the basis of the data broadcasting schedule information obtained at step S604. The broadcasting preparatory process referred

20 herein is obtaining of the broadcasting file from the produced content server, processing of the broadcasting file into the broadcasting data format and generation of the broadcasting control data. At this condition, in the broadcasting unit 120, mapping of the time

25 identifier and the broadcasting data can be established. Step S606:

The broadcasting unit 120 performs process at

steps S603, S604, S605 for all time classification codes, respectively.

Step S607:

The trigger input device 150 obtains the range

5 designation type time object and the association type time object and generates a user interface of the trigger input system.

Step S608:

After completing the foregoing process, the

10 broadcasting unit 120 performs the broadcasting process.

The flow of the broadcasting process at step S608 will be discussed with reference to Fig. 55.

Step S701:

A time of certain time object is fixed. This

15 corresponds to the timing where the time of the range designation type time object or the association type time object is fixed by trigger input or δ minutes before the designated timing of the time fixed type time object. δ is normally set at slightly greater value than

20 a period required for modification of the broadcasting data and is unique value of the broadcasting unit 120.

Step S702, S703:

Concerning objective time object, if broadcasting preparation is not completed, the unitary

25 broadcasting schedule information map generating unit 121 takes the time identifier of the time object and the order information of the time identifier currently fixed

to obtain the data broadcasting schedule information
corresponding to the time identifier from the schedule
control unit 130.

Step S704:

5   The broadcasting preparing unit 122 generates
the broadcasting data corresponding to the fixed time
identifier from the obtained information (broadcasting
preparatory process).

Steps S705, S706, S707:

10   When fixing of the time at step S701 is made by
trigger input, the composite media file broadcasting
unit 123 performs trigger responding process through the
process shown in Fig. 32. Otherwise, the broadcasting
data generated in the broadcasting preparatory process

15   at the designated time is broadcasted.

Step S708:

       The foregoing process is continued up to the end
of the program.

       By the foregoing, broadcasting control in a

20   manner that broadcasting preparatory process is
performed without generating the unitary broadcasting
schedule information map in the broadcasting unit 120.

(6) Sixth Embodiment

       In the shown embodiment, the broadcasting unit

25   120 has a function for designating number of candidates
of the obtained order for the schedule control unit 130.
Furthermore, in the time information output unit 133 of

the schedule control unit 130, the order judgment process of the time identifier is slightly differentiated from that of the third embodiment to perform output even if a plurality of candidates are present but the number of candidates falls within the designated candidate number.

When a plurality of number of candidates of the order of the time identifier are obtained, the broadcasting unit 120 performs the broadcasting preparatory process for all candidates to perform broadcasting process with selecting the one having corresponding order from a plurality of broadcasting data when the order is fixed by the trigger input device 150.

By this, even when time objects of the broadcasting schedule information generated by the organizing unit 100 and the producing unit 110 is not ordered univocally, the broadcasting preparatory process is performed before starting of program if number of combination falls within the given number. After trigger timing. the broadcasting data can be broadcasted instantly.

Fig. 56 shows a procedure of the order judgment process of the time identifier in the time information output unit of the schedule control unit 130. Steps S801 to S806 are similar to steps S301 to S306 (see Fig. 9) in the fourth embodiment.

Step S807:

When the nodes corresponding to the time objects are not arranged in alignment, the time information output unit 133 is obtains the candidate of the order.

This process corresponds to obtaining of all topological orders. Accordingly, all candidates are obtained by repeating topological sorting process.

At first, graph excluding nodes corresponding to the real time values are generated. Next, graph retrieval is performed in the topological sort one by one without passing the route which is passed once. When all routes are passed, the process is terminated.

A plurality of topological order thus obtained are candidates of the order of the time object.

Step S808:

When number of candidates of the order of the time objects obtained at step S807 is less than or equal to input threshold value, all paths (namely all possible orders of the time objects) are output. If number of number of paths is greater than the threshold value, judgment is made that order judgment cannot be made to terminate the process.

Through the foregoing process, one or more kinds of order of the time objects are derived.

The procedure of the broadcasting control process in the shown embodiment is substantially the same as the procedure shown in Fig. 51. When a

plurality of order information of the time object are obtained, the process of the steps S405, S406 of the broadcasting unit 120 is performed for number of times corresponding to obtained number of kinds. The

5   broadcasting data corresponding to each kind are stored in the broadcasting unit 120.

The broadcasting process in the broadcasting unit 120 is substantially the same as the procedure shown in Fig. 52. When a plurality of times of order

10 information of the time objects are obtained, upon fixing of the time at step S501, retrieval is performed whether the broadcasting data corresponding to the fixed order is stored in the broadcasting unit 120 at a timing where the time is fixed at step S502. If the

15 corresponding broadcasting data is present, the corresponding broadcasting data is broadcasted. Otherwise, broadcasting preparatory process is performed at the fixed timing to broadcast the generated broadcasting data.

20 In the foregoing procedure, even for the program, in which the order of the time object cannot be determined univocally, if the kinds of order information is less than or equal to the threshold value, broadcasting can be performed instantly in response to

25 the trigger.

According to the present invention, the following effects can be obtained.

Firstly, a broadcasting unit may attain an aggregate of constituent files of a composite media file per time identifier and can perform broadcasting preparatory process from a condition where fixed

5   broadcasting start timing is not obtained by using order information of the time identifier and hierarchically presenting plurality of data broadcasting schedule information maps. Namely, even with the broadcasting schedule information map, in which the untime

10 broadcasting schedule information of undetermined broadcasting start timing is present in admixing manner. broadcasting preparatory process can be performed as long as the order of the broadcasting start timing is fixed. Therefore, broadcasting can be performed

15 instantly in response to determination of the broadcasting start timing.

Secondly, the composite media file broadcasting program broadcasting control system enables expressing the broadcasting schedule information map where an

20 untime broadcasting schedule information is present even when the untime broadcasting schedule information order of the broadcasting start timing is unknown, to permit judgment whether the broadcasting preparatory process is possible or not and whereby to enable broadcasting

25 preparatory process when the broadcasting schedule information map in higher hierarchy is present.

Thirdly, the composite media file broadcasting

program broadcasting control system can derive the
broadcasting start timing without tracing the hierarchy
of the broadcasting schedule information maps by
separately holing a plurality of data broadcasting
5   schedule information maps for which real time values are
not set and the time information which can be expressed
independently and linearly.

Fourthly, the composite media file broadcasting
program broadcasting control system can realize shifting
10   of the broadcasting start timing required for changing
of the broadcasting start timing of the program or for
reusing, with simple process by varying the value set in
a time object without varying the broadcasting schedule
information maps.

15   Fifthly, in the composite media file
broadcasting program broadcasting control system, all
broadcasting start timings are expressed along a single
time axis and thus makes complicate process, such as
tracing of the hierarchy of the broadcasting schedule
20   information maps upon obtaining the time value.

Sixthly, in the composite media file
broadcasting program broadcasting control system, an
attribute is added to time information managed
independently of the broadcasting schedule information
25   map, and classifying unit is provided for classification
based on the attribute for simplification of taking out
only broadcasting schedule information to be object for

working.

Seventhly, the composite media file broadcasting program broadcasting control system enables broadcasting control of the program designated a screen modification timing in various modes by using four kinds of time objects.

Eighthly, the composite media file broadcasting program broadcasting control system can discriminate portions for which broadcasting preparatory process is possible and portions for which broadcasting preparatory process is not possible in one program by using time classification codes, and enables broadcasting preparatory process for the portion other than the portions where the broadcasting preparatory process is not possible, and thus enables instantly broadcasting of next broadcasting data by the broadcasting unit.

Ninthly, in the composite media file broadcasting program broadcasting control system, a schedule control unit is provides a function for outputting data broadcasting schedule information to be broadcasting at timing from order information of the several kinds of time objects to enable broadcasting unit to prepare broadcasting data.

Tenthly, the composite media file broadcasting program broadcasting control system enables broadcasting preparatory process by providing a function for outputting order information of several kinds of time

objects for the schedule control unit even in the program where the order of the time objects is undeterminable.

5   Although the invention has been illustrated and described with respect to exemplary embodiment thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions may be made therein and thereto, without departing from the spirit and scope of the present

10   invention. Therefore, the present invention should not be understood as limited to the specific embodiment set out above but to include all possible embodiments which can be embodies within a scope encompassed and equivalents thereof with respect to the feature set out

15   in the appended claims.